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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/010,661	11/30/2001	Chun-Yu Lee	B-4413 619365-7	8711
7590	12/30/2003		EXAMINER CHU, CHRIS C	
Richard P. Berg, Esq. c/o LADAS & PARRY Suite 2100 5670 Wilshire Boulevard Los Angeles, CA 90036-5679			ART UNIT	PAPER NUMBER
			2815	
DATE MAILED: 12/30/2003				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/010,661

Applicant(s)

LEE ET AL.

Examiner

Chris C. Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 October 2003.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 - 3 and 7 - 24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 - 3 and 7 - 24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All    b) ☐ Some \*    c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendment filed on October 20, 2003 has been received and entered in the case.

### ***Claim Objections***

2. Claims 1 – 3, 7 – 24 are objected to because of the following informalities:

In claims 1 and 17, various limitations in the claims (e.g., a circuit device, forming plural electrodes on one side thereof) set forth both apparatus and process language, thus overlapping two different statutory classes of invention. Hence the claims fail to conform with current U.S. practice.

Appropriate correction to the claims' grammatical form is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 - 3, 7 - 15 and 17 - 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the acknowledged prior art of e.g., Fig. 1H in view of Tsukagoshi et al. '882.

Regarding claim 1, the acknowledged prior art discloses in e.g., Figs. 1G, 1H and 5c an LCD monitor, comprising:

- a circuit device (3), forming plural electrodes (111, under the element 3a) on one side thereof;
- plural bumps (3a), respectively forming on the electrodes;
- a substrate (4), forming plural first pads (4a, at the top-side on the substrate) and plural second pads (4a, at the bottom-side on the substrate) in accordance with the bumps;
- a means of connection (5), comprising a plurality of conductive particles (1), conducting the bumps and the pads with the conductive particles bonded between; and
- a barrier structure (6) forming on the side of the circuit device, separating the conductive particles,
  - wherein the barrier structure (6) comprises a plurality of first barrier ribs (6, at the top-side in e.g., Fig. 1H) extending along a first direction to form a partition between the bumps corresponding to the first pads, and
  - a plurality of second barrier ribs (6, at the bottom-side in e.g., Fig. 1H) extending along the first direction to form a partition between the bumps corresponding to the second pads.

The acknowledged prior art does not disclose third barrier ribs extending in a second direction. However, Tsukagoshi et al. teaches in e.g., Fig. 6B a plurality of third barrier ribs (6 in e.g., Figs. 5A and 6B) extending along a second direction to form interior partitions between

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bumps (7) corresponding to the first (5, at the top-side) and second (5, at the bottom) pads. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify the acknowledged prior art by employing additional (on third) interior barrier ribs of the same composition as the prior-art's 1<sup>st</sup> and 2<sup>nd</sup> plurality of ribs, extending in a second direction as taught by Tsukagoshi et al. The ordinary artisan would have been motivated to modify the acknowledged prior art in the manner described above for at least the purpose of providing a smooth, uniform flow of adhesive from the center to the edge portions of the semiconductor chip during the bonding procedure (column 5, lines 22 – 30).

Regarding claim 2, the acknowledged prior art discloses the barrier structure being made by an isolating material.

Regarding claim 3, in the prior art, the first pads are input terminals of an LCD monitor, and the second pads are output terminals of the LCD monitor.

Regarding claim 7, Tsukagoshi et al. discloses in e.g., Fig. 5A (leftmost portion) and Fig. 6B the first and the third barrier ribs being connected, forming a plurality of L-shaped structures.

Regarding claims 8, 10 and 20, the acknowledged prior art and Tsukagoshi et al. expressly depict all of the claimed invention's elements except for the barrier ribs forming a plurality of separated T-shaped structures. Nonetheless, Tsukagoshi et al. further discloses that the spacers may take on a wide range of forms such as --but not limited to-- various linear forms (e.g., u-shapes or L-shapes), polygons, triangles or circles, and that these shapes can optionally be combined or mixed (e.g., column 5, lines 12 - 25). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine, mix or rearrange the linear (e.g., L-shaped) structures to be "T-shaped structure." The ordinary artisan would have

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been motivated to further modify the acknowledged prior art and Tsukagoshi et al. in the manner described above depending only upon conventional considerations such as the specific size, disposition and spacing of the chip structures and the barrier ribs of the particularly desired package for the purpose of optimizing through routine experimentation the uniformity of the conductive particles' distribution. See e.g., *In re Japikse*, 86 USPQ 70 for the proposition that rearranging parts of an invention involves only routine skill in the art.

Regarding claim 9, Tsukagoshi et al. discloses in e.g., Fig. 6B the second and the third barrier ribs are connected, whereby forming a L-shape structure.

Regarding claims 11 and 13 – 15, regardless of whether the acknowledged prior art or any of the references cited in the Background section of the specification discloses the materials of the isolating material, the bump and the substrate; and the specific device of the circuit device, Tsukagoshi et al. teaches in column 4, lines 16 – 18, column 6, lines 24 – 33, column 11, line 2, column 4, lines 43 – 48 and column 9, line 17 the isolating material being polyimide (PI), the bump being made by Au, the substrate being made by glass and the circuit device being an integrated circuit. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify the acknowledged prior art by using the polyimide for the isolating material, the Au for the bump material, glass for the substrate and the integrated circuit for the circuit device as taught by Tsukagoshi et al. The ordinary artisan would have been motivated to further modify the acknowledged prior art in the manner described above for at least the purpose of increasing electrical connection and obtaining a good reliability for a long period time (column 11, lines 6 and 7).

Regarding claim 12, the acknowledged prior art discloses in e.g., Fig. 1G and page 1, line 16 the connecting means being an anisotropic conductive film.

Regarding claim 17, the acknowledged prior art discloses in e.g., Figs. 1G, 1H and 5c a semiconductor device, comprising:

- an electrode (111, under 3a) formed on a base surface;
- a bump (3a) formed on the electrode;
- a pad (4a) comprising plural first pads (4a, at the top-side on the substrate) and second pads (4a, at the bottom-side on the substrate);
- a connecting means (5), comprising a plurality of conductive particles (1), whereby conducting the bump and the pad with the conductive particles bonded between; and
- a barrier rib (6) forming on the base surface, separating the conductive particles,
  - wherein the barrier rib (6) comprises a plurality of first barrier ribs (6, at the top-side in e.g., Fig. 1H) extending along a first direction to form a partition between the bumps corresponding to the first pads, and
  - a plurality of second barrier ribs (6, at the bottom-side in e.g., Fig. 1H) extending along the first direction to form a partition between the bumps corresponding to the second pads.

The acknowledged prior art does not disclose third barrier ribs extending in a second direction. However, Tsukagoshi et al. teaches in e.g., Fig. 6B a plurality of third barrier ribs (6 in e.g., Figs. 5A and 6B) extending along a second direction to form interior partitions between bumps (7) corresponding to the first (5, at the top-side) and second (5, at the bottom) pads. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was

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made to modify the acknowledged prior art by employing additional (on third) interior barrier ribs of the same composition as the prior-art's 1<sup>st</sup> and 2<sup>nd</sup> plurality of ribs, extending in a second direction as taught by Tsukagoshi et al. The ordinary artisan would have been motivated to modify the acknowledged prior art in the manner described above for at least the purpose of providing a smooth, uniform flow of adhesive from the center to the edge portions of the semiconductor chip during the bonding procedure (column 5, lines 22 – 30).

Regarding claim 18, in the prior art, the first pads are input terminals of an LCD monitor, and the second pads are output terminals of the LCD monitor.

Regarding claim 19, Tsukagoshi et al. discloses in e.g., Fig. 6B the first and the second barrier rib are respectively connected to the third barrier rib, forming a plurality of L-shaped structures.

Regarding claim 21, regardless of whether the acknowledged prior art or any of the references cited in the Background section of the specification discloses the materials of the isolating material and the bump, Tsukagoshi et al. teaches in column 4, lines 16 – 18, column 6, lines 24 – 33, column 11, line 2, column 4, lines 43 – 48 and column 9, line 17 the isolating material being polyimide (PI) and the bump being made by Au. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify the acknowledged prior art by using the polyimide for the isolating material and the Au for the bump material as taught by Tsukagoshi et al. The ordinary artisan would have been motivated to further modify the acknowledged prior art in the manner described above for at least the purpose of increasing electrical connection and obtaining a good reliability for a long period time (column 11, lines 6 and 7).

Regarding claim 22, the acknowledged prior art discloses in e.g., Figs. 1G, 1H and 5c a method for making a semiconductor device, comprising the steps of:

- providing a circuit device (11), wherein the circuit device is formed with plural electrodes (111) on one side thereof;
- forming a protective layer (112) on the side of the circuit device with the electrodes exposed;
- forming plural bumps (12) on the protective layer in accordance with the electrodes, and conducting the electrodes and the bumps; and
- forming a plurality of first and second barrier ribs (6) on the side of the circuit device.

The acknowledged prior art does not disclose third barrier ribs extending in a second direction. However, Tsukagoshi et al. teaches in e.g., Fig. 6B a plurality of third barrier ribs (6 in e.g., Figs. 5A and 6B) extending along a second direction to form interior partitions between bumps (7) corresponding to the first (5, at the top-side) and second (5, at the bottom) pads. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify the acknowledged prior art by employing additional (on third) interior barrier ribs of the same composition as the prior-art's 1<sup>st</sup> and 2<sup>nd</sup> plurality of ribs, extending in a second direction as taught by Tsukagoshi et al. The ordinary artisan would have been motivated to modify the acknowledged prior art in the manner described above for at least the purpose of providing a smooth, uniform flow of adhesive from the center to the edge portions of the semiconductor chip during the bonding procedure (column 5, lines 22 – 30). Furthermore, the acknowledged prior art and Tsukagoshi et al. disclose the first, second and third barrier ribs according to the locations of the bumps in the first and second direction, thus the acknowledged

prior art and Tsukagoshi et al. discloses the following limitation “a plurality of first, second and third barrier ribs ... thereby separating the bumps.”

Regarding claim 23, the acknowledged prior art, as modified, discloses the first barrier ribs being perpendicular to the third barrier ribs.

Regarding claim 24, the acknowledged prior art discloses in e.g., Fig. 1H the first barrier ribs being parallel to the second barrier ribs.

5. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over the acknowledged prior art and Tsukagoshi et al. as applied to claims 1 and 2 above, and further in view of Loh et al. '919.

Regarding claim 16, Tsukagoshi et al. does not disclose that the circuit device may be a flexible printed circuit. Regardless of whether the acknowledged prior art or any of the references cited in the Background section of the specification discloses that the device may be a flexible printed circuit, Loh et al. teaches in Fig. 4 and column 5, lines 24 ~ 28 a circuit device (14) being a flexible printed circuit. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify a device according to the prior art/Tsukagoshi et al. by using the flexible printed circuit for the circuit device as taught by Loh et al. The ordinary artisan would have been motivated to modify the base references in the manner described above for at least the purpose of increasing reliability and flexural strength of the package so as to make the package more deformable during carrying.

***Response to Arguments***

6. Applicant's arguments with respect to claims 1, 9, 10, 17 and 22 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu  
Examiner  
Art Unit 2815

c.c.  
12/24/03 2:56:42 PM

**BRADLEY BAUMEISTER**  
**PRIMARY EXAMINER**  
